

Revolutionary Performance For Ultra Low Reynolds Number Vehicles, Phase I

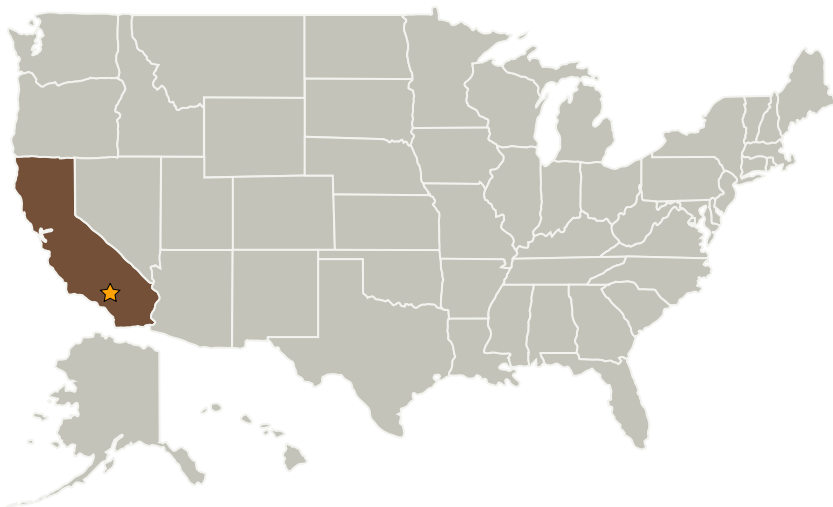
Completed Technology Project (2005 - 2005)



Project Introduction

An important mission for NASA is the development of revolutionary flight concepts and technology. The development of Micro unmanned air vehicles (Micro-UAVs) and Mars aircraft has received considerable attention in recent years. Unlike conventional aircraft and UAVs, Micro-UAVs and Mars aircraft suffer from operation in an extremely low Reynolds number flight regime. Both Micro-UAVs and Mars aircraft can have operational Reynolds number regimes from 20,000 to 120,000. At these extremely low Reynolds numbers, the aerodynamic flow features are dominated by laminar separation and separation bubble effects, which are the primary source of poor performance in both drag and maximum lift for this class of vehicles. It is proposed to use a robust and powerful active transition fixing technique to eliminate the effects of these large separation bubbles and provide revolutionary performance as of yet unobtainable by this class of ultra low Reynolds number vehicles. By artificially transitioning the flow upstream of the laminar separation bubble, the bubble itself can be eliminated resulting in a greatly reduced drag. The increased resistance to separation of a simple turbulent boundary-layer can pay revolutionary dividends at these very low Reynolds numbers.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission
Directorate (STMD)

Lead Center / Facility:

Armstrong Flight Research
Center (AFRC)

Responsible Program:

Small Business Innovation
Research/Small Business Tech
Transfer

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Organizations Performing Work	Role	Type	Location
★Armstrong Flight Research Center(AFRC)	Lead Organization	NASA Center	Edwards, California
Rolling Hills Research Corporation	Supporting Organization	Industry	El Segundo, California

Primary U.S. Work Locations

California

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Michael Kerho

Technology Areas

Primary:

- TX10 Autonomous Systems
 - └ TX10.3 Collaboration and Interaction
 - └ TX10.3.4 Operational Trust Building